CHAPTER 11

FIELD KITCHENS

At some point you may be assigned to an amphibious or naval mobile construction battalion and accompany it ashore as a member of a landing party. A landing party usually consists of 100 personnel and has 2 or 3 MSs assigned. As an MS, you should be prepared to provide food for those troops you accompany. You also will probably become involved in locating the proper site for the field kitchen and in its construction. This chapter will present to you the skills needed to accomplish the following:

- Select field kitchen sites
- Plan a layout of field kitchen facilities
- Unpack and set up kitchen tents
- Unload and arrange field kitchen equipment in the kitchen tents
- Clean and reload field kitchen equipment
- Pack and store field kitchen tents

FIELD KITCHEN SIGHT SELECTION AND LAYOUT CHARACTERISTICS

Naturally, you will want the best available site for your field kitchen. The general area in which personnel will be fed is normally determined by the shore party commander. You, the MS, may have to recommend the selection of a particular site.

PLANNING THE LOCATION

There are several details to look for when you pick a site. Figure 11-1 lists the characteristics of a good field site. It also explains why these characteristics are important.

Type of Terrain

If there is danger of bombing or other enemy action, select a location that provides good natural cover and is well shielded from observation.

High, dry ground near a slope that provides good drainage is desirable. A good water supply should be nearby, with an access road for kitchen traffic only, if possible. Your galley should be at the proper distance away from the heads.

CHARACTERISTIC	IMPORTANCE
Good natural cover	Shields troops from the enemy aerial observation, protects them from sun, heat and cold winds
Good access roads	Lets supply trucks move freely
High and dry ground near a protected slope	Ensures good drainage and protects you from the wind
Enough space	Eliminates crowding of the troops and facilities spreading out the equipment so personnel can work efficiently
Near source of potable water	Used in preparation of foods (water point) and beverages
Sandy or gravelly soil	Lets excess water seep away and helps soakage pits and trenches work well

Figure 11-1.—Characteristics of a good field site.

Water Supply

You should regard all water in the field as contaminated until bacterial analysis reveals it to be potable. It may become contaminated during distribution and storage. Consider all untreated water unsafe until a medical representative approves it for use. During the initial phase of amphibious operations, each unit may carry its own water or depend on a local supply. The local supply of water must be disinfected and placed in sterilized lyster bags (36-gallon canvas bag) or canteens.

The responsibility for the adequacy and safety of the water under these conditions normally falls largely on the unit medical officer. However, you should be familiar with chapter 5, "Water Supply Ashore," of the *Manual of Naval Preventive Medicine,* NAVMED

P-5010. This chapter discusses in detail the following: water supplies, sources of water, water analysis, standards and purification of water, and the *Standard organization and Regulations of the U.S. Navy,* OPNAVINST 3120.32, in case medical personnel are not available. Remember that none of the methods of disinfecting water contained in these publications destroys radioactive substances or chemical poisons.

GROUNDWATER.— Groundwater from springs or wells is usually better than surface water. When you use water from a ground source, be sure it is a safe 100 feet or more from sources of contamination. Some sources of contamination are heads, septic tanks, and cesspools. In limestone ground formations, the distance may need to be much greater. Wells and springs should be constructed to exclude surface water and high-groundwater infiltration. Well and spring sites should not be subject to flooding.

SURFACE WATER.— Surface water is water from rivers, lakes, streams, and ponds. When you must use water from a surface source, take it from a point well above and away from sewer outlets. Avoid places where refuse drains into a river, stream, or lake, and oily areas where wastes and drainage may make the water unpalatable or unfit for use. Always choose the clearest water possible; the clearer the water, the easier it is to disinfect and the better its appearance will be. Clearness, however, is no guarantee of safety. All surface water must be treated.

Clean water receptacles daily with boiling water and rinse with a solution of potassium permanganate (one-third of a teaspoonful of potassium permanganate

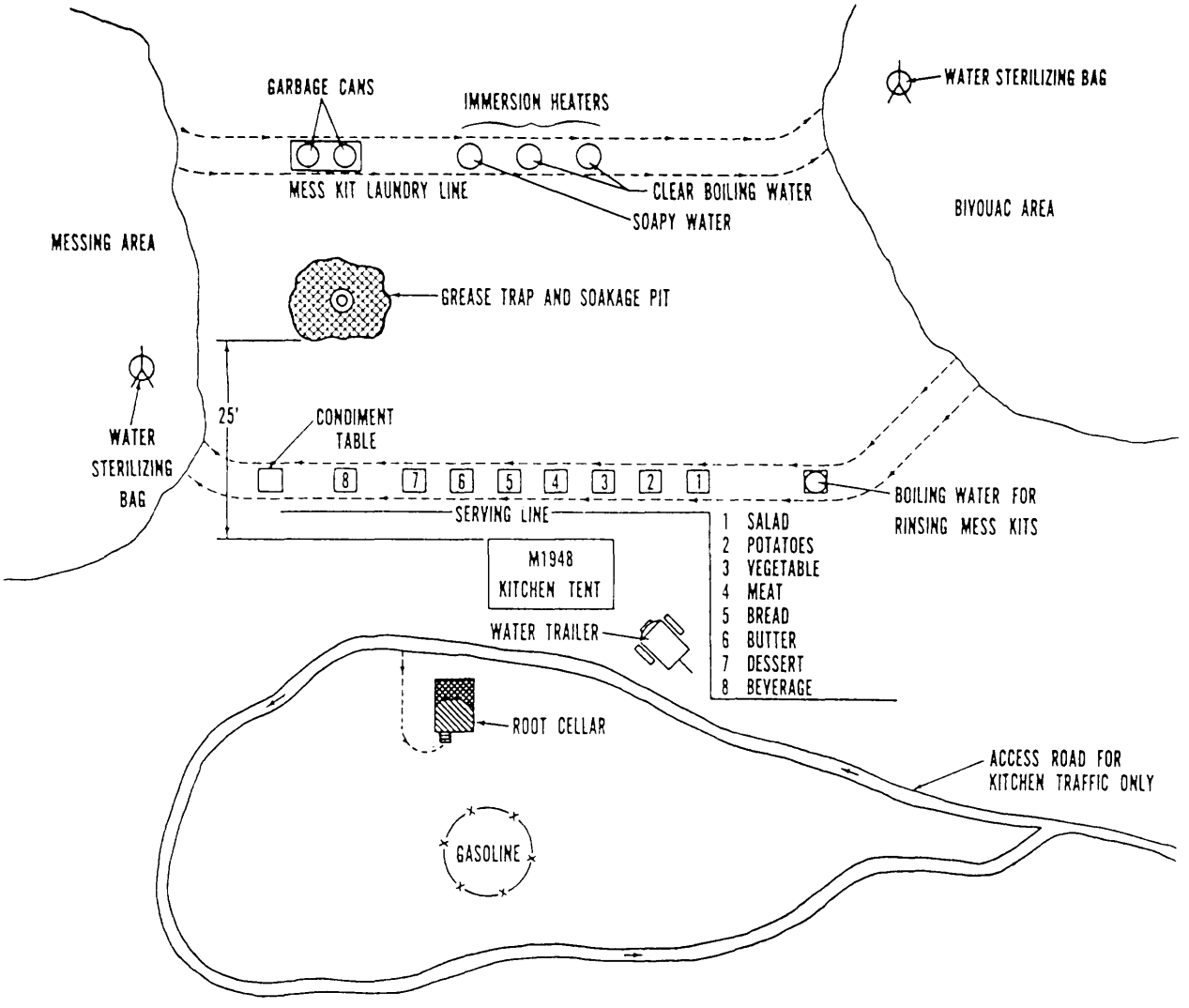

Figure 11-2.—Rear area layout for field feeding.

to 1 gallon of water). You also can use a solution of chlorinated lime and water for this purpose. The formula is 1 part lime to 1,000 parts water.

PLANNING THE KITCHEN LAYOUT

A kitchen layout shows you where to place waste disposal facilities. It shows a smooth traffic flow through the serving line and mess kit laundry line. A smooth traffic flow allows the troops to get away from the area easily if they must move fast.

Make sure all latrines are at least 100 feet from the nearest natural water source and at least 100 yards from foodservice areas.

A layout for a rear area feeding situation is shown in figure 11-2.

Storage of Food

If you are to stay in one place for several days or more, you must provide storage facilities. If you do not have mechanical refrigeration in temporary camps, you may place food in water containers and put these containers in springs or streams.

It is also possible to keep food items in the ground for a short time. This takes advantage of the insulating and cooling qualities of the moist earth beneath the surface. This also protects stored food from the elements. Dig a hole, line it with burlap sacks and boards, then place the food, in its original container, in the hole. Once this is done, cover it with soil, straw, or leaves.

For small amounts of food you can use a food box screened with wire or cloth netting suspended from the branch of a tree. This is called a swinging food box (fig. 11-3). The oil cup keeps insects from crawling down the wires to the box.

The root cellar has one of the advantages of a mechanical walk-in refrigerator. It makes foods easier to handle, especially when the foods are in bulk form. The height of the root cellar permits personnel to carry foods in or out of the cellar without stooping or bending.

You can construct a root cellar if the terrain is hilly and a location is found that slopes upward at a sharp angle. The size of the excavation will vary according to the storage space required. Once the excavation is complete, reinforce the sides and line with waterproof material. Level the floor, cover it with dunnage, and grade away the entrance. Use heavy boards or logs to form the roof, then cover with a tarpaulin. Provide top

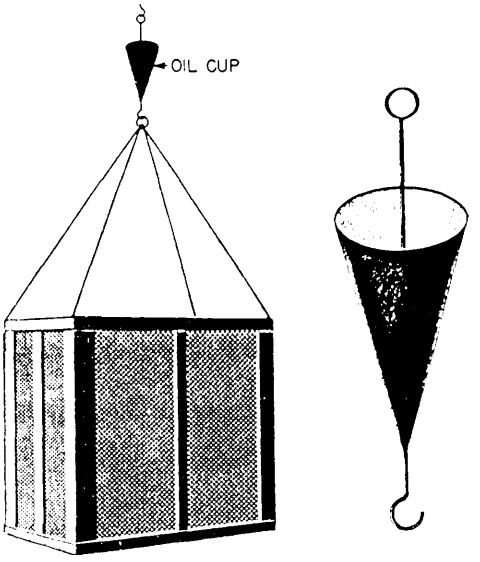

Figure 11-3.-Swinging food box.

ventilation by making openings at the tops of the cellar sides. Fit the entrance with a door large enough to permit easy passage for personnel carrying food in the largest expected bulk form. Always keep the door closed and covered with a canvas flap when it is not in use. Fill all the spaces between exposed logs or boards with wet earth.

You can construct an underground food box when the terrain is flat or when you need more space. The simplest kind consists of a packing box and a hole dug to fit it. After you dig the hole, lower the box into it. Then shovel loose earth into the spaces between the box's outside walls and the sides of the hole. Next, pack this earth into a tight fit. Fashion the top of the box into a door. Line the underside of the top with canvas or some similar material. This will help make it airtight. (See fig. 11-4.)

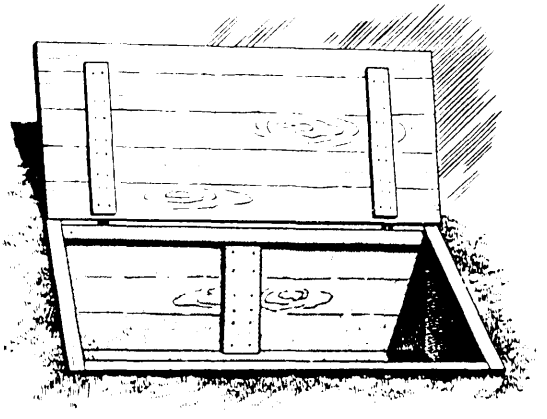

Figure 11-4.—Underground food box.

To make a double-walled type of food box, use one large packing box and one that is slightly smaller. Drill holes in the bottom of the larger box and cover its outer walls with waterproof paper or some similar material. Convert the top into a door with hinges. Then dig the pit slightly larger than the box and fill the bottom with about 4 inches of stone or gravel. Sink the box inside the larger one, allowing for a space of from 3 to 4 inches between the sides of the two boxes all the way around. Stuff sawdust, straw, or grass between the two boxes to serve as insulation. For best results, always keep this material damp. Camouflage the box, when necessary, by placing a wet blanket over it and covering the blanket with leaves.

The natural refrigeration provided by both the root cellar and the food box is supplemented by the thawing of the frozen meats within the storage space. Frozen meats will help refrigerate other perishables during the period required for them to thaw. If ice is available, you can partition off one end of the food box to form an ice compartment.

Garbage Disposal

Garbage is best disposed of by burying or burning. To bury garbage, dig a trench 4 feet deep or more. Dump the garbage into the pit, packing it down in layers. Then cover the exposed layer with a few inches of dirt each day. When you abandon the garbage site, cover it with a minimum of 2 feet of mounded earth.

To incinerate garbage, you must first remove all excess moisture. The cross-trench incinerator (fig. 11-5) provides one of the best methods of burning garbage. To construct such a trench, dig two trenches 8 feet long, 1 foot wide, and 1 foot deep, that cross at their centers. The bottom of each trench should taper up to the level of the ground toward the ends. A grate made of a piece of scrap iron or pipe about 24 inches long is built over the centers. At the intersection of the trenches, build a coal or wood fire. When the fire has become hot enough, add rubbish or drained garbage as fuel. This incinerator functions best if three of the four sides of the trenches are blocked off, with the open side facing into the wind.

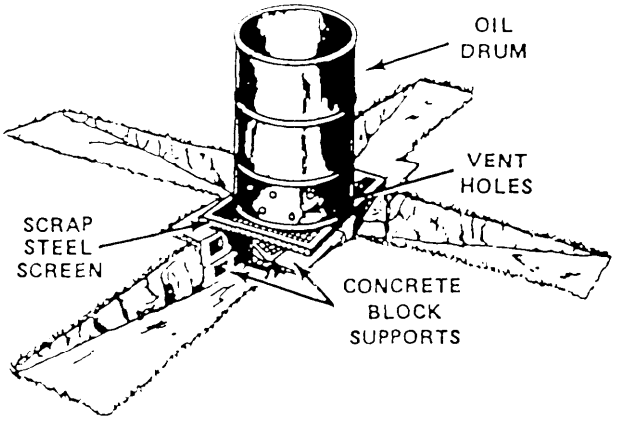

Figure 11-5.-Cross-trench incinerate.

This type of cross-trench fire can be used for cooking as well as incinerating. Two cross-trenches provide enough cooking facilities to prepare meals for 100 people and six of them provide enough cooking facilities to prepare meals for 500 people.

To dispose of cans, you can wash them and use them as substitutes for cooking and eating utensils. You also can open both ends, flatten them, and bury them with the garbage. Glass jars also can be used as substitute eating utensils. When disposing of glass jars, break them up and bury them with the garbage.

Liquid wastes, such as grease, may be burned or buried with the garbage. The exception is any usable grease that can be used for cooking. Other wastes are best disposed of in the soakage pit (fig. 11-6). This pit should be at a minimum of 25 feet from the kitchen area.

FIELD KITCHEN TENTS

This section of the chapter presents you with the knowledge required to unpack and setup a field kitchen tent. You also will become familiar with the procedures used for packing and storing tents once field mess operations are complete.

The general-purpose medium (GPM) tent (fig. 11-7) is designed for field kitchen use. This tent is rectangular and pole supported. It consists of cave poles, door pies, center upright poles, a ridge pole, and a liner. The general specifications are as follows:

Ridge height (top)	10 feet
Eave height (outer perimeter)	5 feet 6 inches
Length	32 feet 8 inches
Width	16 feet
Floor area	512 square feet
Tent weight	269 pounds
Liner weight	100 pounds
Poles and pins	200 pounds
Total weight	569 pounds

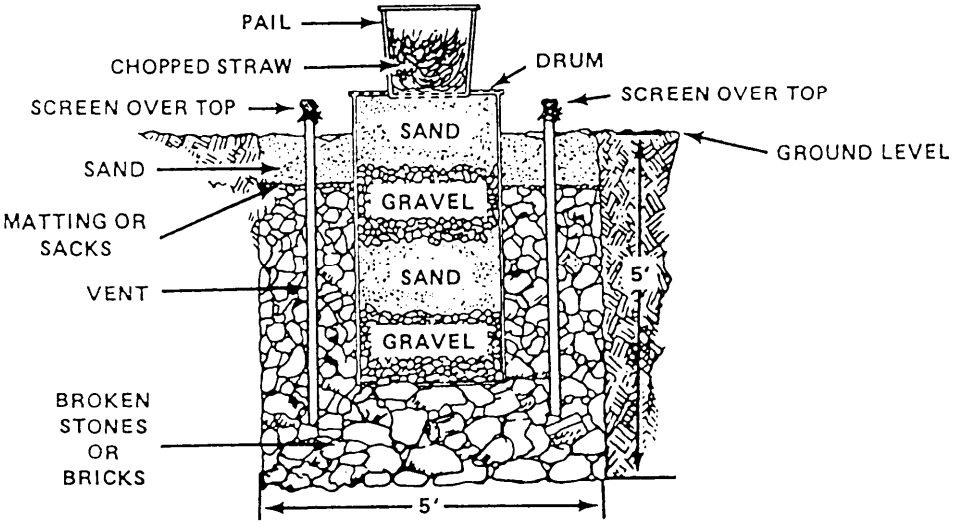

Figure 11-6.—Soakage and grease trap.

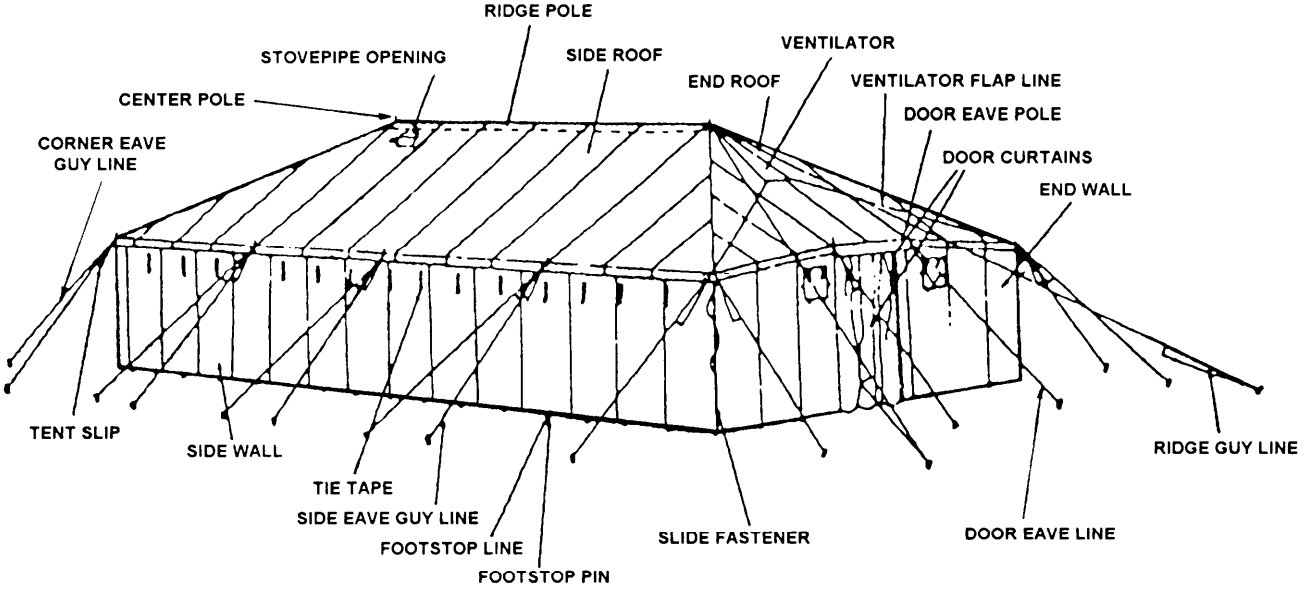

Figure 11-7.-General-purpose medium tent.

UNPACKING THE TENT

You are now somewhat familiar with the GPM field kitchen tent specifications and parts. We will now discuss the preparation for pitching the tent.

Preliminary Procedures

You should frost make sure the selected area for the tent is on level ground and is free of projecting roots and rocks. When conditions permit, pitch the tent away from natural elevations such as hills or tall equipment that might obstruct a draft through the tent stack

Remove the tent from its cover and spread it on the ground in a rectangular position with the sides extended.

Tent Components and Inspection

On the window flap located at one end of the tent will be a flap stop that reads Care and Maintenance. This panel contains an inventory list and erecting instructions. Use this to make certain all items are present and in serviceable condition.

It is very important that you inspect and inventory the parts both before erecting and after disassembling the tent. Tent disassembly is discussed later. The component and maintenance checks consist of the following:

- Tent body. Inspect for abrasions, mildew, holes, poor condition of previous repairs, broken stitching, evidence of leaks, and low fabric tensile strength.
- Tent lines. Check the tent lines for frayed or raveled ends and for broken strands.
- Tent poles. Check poles for cracks, splinters, and damaged metal parts.
- Tent pins. Check pins for breaks and cracks. There are twenty-eight 24-inch pins and forty-eight 16-inch pins.
- Tent hardware. Check hardware for rust, looseness, damage, and missing hardware.
- Tent cover. Examine cover for rips, mildew, broken stitching, frayed tie lines, and loose or missing grommets.
- Slide fasteners. Inspect for damage and freedom of movement. Lubricate when slide fastener is hard to move up or down.

SETTING UP THE TENT

At this point, you have selected an appropriate site for the tent. You are also familiar with the tent components and have made certain all items are present and in serviceable condition. Now you can begin to set up the tent.

When you are setting up the tent, use only tent parts and accessories for their intended purpose.

Component Assembly

You should begin to construct the tent by first assembling the poles. The tent has 1 ridge pole, 2 upright-center poles, 4 corner wall poles, 4 upright door poles, and 10 cave poles.

The ridge pole comes in three sections. Two metal bands allow you to join these sections. lighten the four bolts that go through the bands to further secure these sections.

The two upright-center poles (10 feet 3 inches) come in two sections. To assemble the upright-center poles, insert the end of the section without the band into the section having the metal band.

Raising and Securing the Tent

Due to the extreme technical nature of this process, the instructions that come with the equipment should be followed. Remember, these instructions should be on the window flap at one end of the tent under the Care and Maintenance heading. General instructions also may be found in the *Marine Corps Combat Feeding Workbook,* P-MCBLC 1179 (Rev. 12-91). If instructions are lacking, find a service member with enough experience to direct the raising and securing processes.

The following are some safety points to observe when erecting the tent:

- When lifting the tent, start in the correct squatting position and use your legs to avoid back injury.
- When working near frame hinges, be careful to avoid pinching your hands or fingers. Do not hold the hinge at the ridge or cave location.
- Do not use the Yukon stove (M1950) in the expendable modular tents.
- Raise and lower the entire side of the tent smoothly and evenly to avoid damaging the frame.
- Make sure to leave enough air space between the tent wall and foodservice equipment. When the M2 burner units are lit, they get hot. Frequently check the tent wall for heating while using the M2 burner units. Move the M2 burner units further away from the tent wall if necessary. If they are too close to the tent wall, they could ignite the tent.
- Do not step on tent components.
- To avoid damaging the tent frame, do not twist or turn it when handling.
- Clear and level the ground before installing the floor. Sharp objects or ground depressions can damage the tent floor.
- Be careful when moving or storing tent components to avoid damaging the fabric.
- If using an M1941 stove, make sure to tie the stovepipe flap securely with the two tie tapes provided.
- Remember that under high wind conditions extra personnel are needed to safely erector strike the tent.

FOLDING AND STORING THE KITCHEN TENTS

The striking or disassembling of the kitchen tent is too technical to be explained in this manual. However, you will find these striking procedures in the *Marine Corps Combat Feeding Workbook,* P-MCBLC 1179 *(Rev. 12-91).* Also, the assistance of a service member having such experience would be helpful. Once disassembled, the tent must be properly folded and stored.

Folding the Tent

Once the poles have been disassembled and pins and lines removed, you can fold the tent. Close and secure doors and stovepipe openings. Then open the corner slide fasteners.

Spread the tent out flat with the outside up. Then, coil the guy lines and place them on the tent roof. Fold the end walls and the side walls over the cave line on the tent hood. Sweep the dirt from the tent after each fold Next, fold the ends of the tent toward the center, making 6-foot folds. Finally, fold the two remaining 6-foot folds from each end of the tent together.

Storing Instructions

Most tents are mildew resistant. This does not mean that they are not subject to mildew. Under warm and damp conditions, espcially in tropical jungle areas, mildew can ruin tents. This may occur in a few days if proper care is not taken. To prevent mildew, the following precautions should be taken:

- Never fold or roll a wet tent. Be especially sure the seams and edges of the tent are dry and clean.

- Before storing, dry the tent by hanging it up off the ground in bright sunlight. If necessary, you can dry a tent indoors. This is done by hanging it in a well-ventilated place, high enough to suspend the tent off the floor.

- Do not drag the tent along the ground while transporting or allow it to come in contact with the ground while in storage.

Be careful in handling pins and poles to see that they are not broken or otherwise damaged. When transporting or storing, keep pins and poles separate from the tent. Clean and dry all pins and poles before storing.

Inspect all lines before storing. The stability and safety of the tent may depend on the condition of the various lines used. Deterioration in the lines is of two kinds: physical and chemical. Surface wear or internal friction between fibers causes physical damage. Exposure to weather conditions and acids causes chemical damage. To prevent damage to tent lines, observe the following rules:

- Keep lines clean. If lines become dirty, wash them in clean water and dry thoroughly.

- Dry lines properly after exposure to dampness. Lines are best dried when hung loosely between two trees or other objects so they do not come in contact with the ground

- Store lines properly in a dry, unheated building or room with free air circulation. Place lines in loose coils off the floor on wooden gratings or hang them on wooden pegs. Never store lines in a small confined space without air circulation.

FIELD KITCHEN EQUIPMENT

Normally, you will have either a gasoline field range outfit or a small detachment cooking outfit, plus immersion-type heaters for cans and tank trailers. These will make it possible for you to cook and maintain sanitary standards almost as well as you can in a galley aboard ship.

FIELD RANGES

Gasoline field range outfits are the most satisfactory appliances available for preparing meals in the field. The armed forces now use model M59. Chapter 10 of the *Basic Doctrine for Army Field Feeding, FM 10-23,* covers the operation of the model M59 field range. *Operator, Organizational and Direct Support Maintenance Manual including Repair Parts and Special Tools List for Range Outfit Field, Gasoline, Model M59,* TM 10-7360-204-13&P, covers the maintenance and repair of model M59. See figure 11-8 for an illustration of the M59 range. One field range is adequate for 50 personnel or less. With two ranges, you can cook for 50 to 100 personnel. With three ranges, you can cook for as many as 225 people.

The gasoline field range outfit is designed to provide a complete outfit adaptable to the different requirements of field operations. The outfit consists of a cabinet with a burner unit, accessory outfit, and necessary cooking utensils (fig. 11-9). The outfit is portable and can be operated while in transit.

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Figure 11-8.-M59 field range.

The range outfit can be used for boiling, roasting, frying, and griddle cooking and can be adjusted to work as a bake oven. Some baking can be done in the covered roasting pan or in the cake pan placed inside the covered roasting pan. Pies bake well in the roasting pan alone. However, for all other baked foods, you should use the cake pan. If you do a great deal of baking with the range, make the necessary adaptation.

For complete information on safety precautions operating and maintenance instructions, basic issue items lists, and maintenance allocation charts, you should refer to the applicable Army technical manual (TM). Be sure you have the appropriate TM for the particular range model (for example, M59) that you are using.

Operation of the burner unit used on the model M59 field range is discussed next.

Preheat Period

When you are lighting the M2 burner unit installed in the M59 field range, follow these procedures in the order listed. (See fig. 11-10 for the part number in parentheses.)

1. Remove the burner unit from the cabinet and take it to a well-ventilated, outside area.

2. Close the preheater valve (6) and the flame (generator) valve (9).

3. Stand the unit in a vertical position and loosen the fuel filler cap (12) by turning counterclockwise, slowly releasing air pressure.

4. Fill the tank until fuel can be seen at the base of the fuel filler cap (12). **CAUTION:** Do not overfill!

5. Install and tighten the fuel filler cap (12).

6. Remove the air valve cap (5). Place the unit in a horizontal position and attach the hand pump to the air valve (5).

7. Pump until the air pressure gauge (11) reads 10 to 20 pounds.

8. Rotate the preheater orifice cleaner control lever (7) several times to clean the preheater orifice; the handle should be pointing down when you are finished.

9. Place a lighted match near the preheater burner head (3) and open the preheater valve (6) one-fourth of a turn.

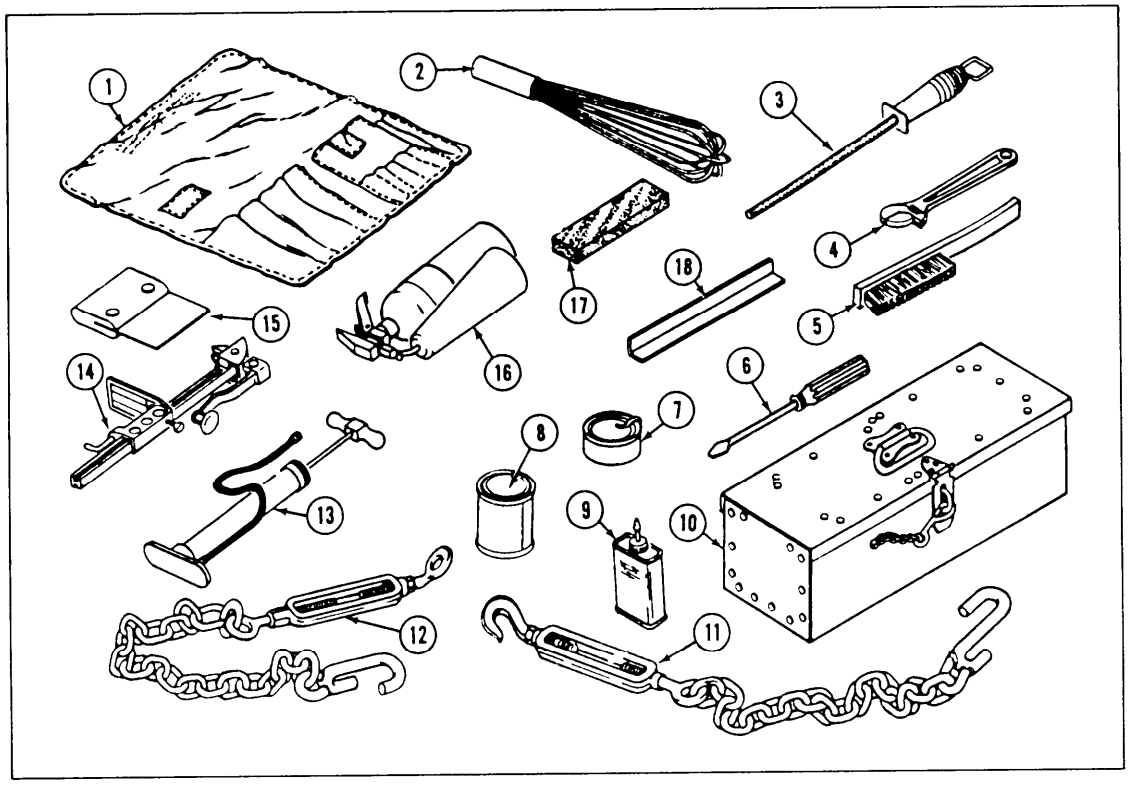
10. Allow the preheater burner head (3) to burn for 30 seconds after ignition or until the flame burns evenly. Then turn the preheater valve (6) counterclockwise until it is completely open.

11. Allow the preheater burner head (3) to burn until the full length of the generator (1) is hot to the touch.

12. Set the air shutter handle (8) in a half-open position.

Conversion Period

Turn the flame valve (9) slowly counter-clockwise to the open position. The burner should ignite before the valve is completely open. Adjust the air shutter level with the air shutter handle (8) until the burner flame color is sea green. Turn the preheater valve (6) clockwise. The normal operating pressure is 10 to 20 pounds.



1. Cutlery roll
2. Egg whip
3. Butcher's steel
4. Wrench
5. Wire brush
6. Screwdriver
7. Lid of graphite can
8. Graphite (antiseize compound)
9. Lubricating oil
10. Chest tool
11. Chain, tie-in, left
12. Chain, tie-in, right
13. Pump
14. Can opener
15. Scraper
16. Fire extinguisher
17. Sharpening stone
18. Burnerhead slot cleaner

Figure 11-9.—Accessory outfit for M59 field range.

Turning Off Burner Unit

Extinguish the flame on the main burner by closing the flame valve (clockwise) all the way.

Safety Precautions

Obey the following safety rules:

- Never refuel a hot unit.
- Do not remove air pressure while the unit is burning or hot.
- Do not open the fuel filler cap while near open flames.
- Assign a specific person the responsibility of constantly checking the air pressure gauge reading. Do not operate beyond 30 pounds of pressure.
- Do not tighten fittings while the burner is in operation.

SMALL DETACHMENT COOKING OUTFIT

The small detachment cooking outfit consists of a stove and the necessary attachments and utensils required to prepare rations for 15 to 40 personnel. The outfit is designed primarily for outdoor use by isolated detachments. If used indoors, a smokestack provided with the outfit must lead outside to avoid carbon

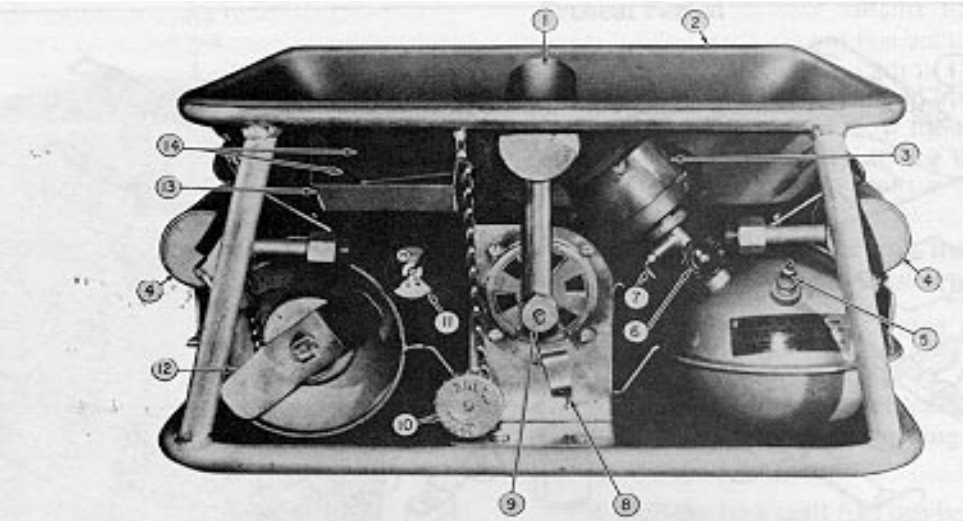


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Figure 11-10.—Burner unit and parts.

monoxide poisoning. The outfit is divided into two sections that weigh about 40 pounds each and is easily carried on two backboards. A 5-gallon can that completes the necessary equipment may be carried on a third packboard.

The immersion-type heater is designed for use with corrugated cans and tank trailers. It is used primarily to heat water for washing and sanitizing dinnerware and cooking utensils in the field. It is designed to heat water in either 24- or 30-gallon corrugated cans.

In cold climates, the heater can be used for melting snow or ice into water. It also can keep existing water supplies from freezing. In extreme emergencies, the heater may be used to heat a tent or other shelter, provided the exhaust fumes are piped out of the enclosed space.

Gasoline is the prescribed fuel. Although kerosene, diesel oils, and fuel oils may be burned in the heater, they produce more smoke and require a longer preheating period. A full tank of gasoline (2.2 gallons) should run the heater for 6 hours under normal operating conditions. However, if operated continuously at a high-fire rate, a tank of gasoline may be consumed in less than 4 hours.

The tank trailer water heater is designed for use in cold climates to keep water supplies from freezing. It is used to heat water in 250- and 400-gallon water tank trailers and in a 700-gallon water tank truck. With the same provisions as the immersion-type heater, it also can be used in emergencies to heat a tent or other personnel shelter. Fuel requirements and capabilities of the heater are same as those of the corrugated can heater.

The Army TM, *Basic Doctrine for Army Field Feeding*, FM 10-23, contains the minimum information necessary to safely operate the immersion-type heater. Be sure you receive a copy of the TM with the immersion heater.

IMPROVISED STOVES

Any large metal container, such as a washtub, can be easily made into a stove. It is only necessary to provide an opening for tending to the fire and the bottom draft and to make a chimney at the top. A tin can with both ends removed makes a good chimney.

You can make a surprisingly efficient gasoline stove by using two cans. Pierce the outer empty can, preferably a No. 10 can, with nail holes. This is done from the top sides down to within about 1 1/2 inches from the bottom. Next, put clean sand into the can filling it up to the level where the holes begin. Then saturate the sand with gasoline. There should be no liquid gasoline visible on top of the can.

Use any can of smaller size for the inner can. Puncture it on the sides and bottom with holes. Then, place it in the center of the larger can, bottom up. The nail holes furnish a draft and upward direction of heat.

If no better way is available, you can set up a makeshift cooking arrangement. This is done by suspending a long green pole, preferably one that has not dried out, between two upright supports. Suspend the kettle of food directly over a flame or push it to the side to keep warm.

UNLOADING KITCHEN EQUIPMENT

You must first unload the field kitchen equipment from the vehicles that delivered it to the field before you can use it. This equipment is heavy. You should not try to unload an M59 field range outfit by yourself; always seek help.

When there is enough personnel to unload the equipment, ease the equipment off the truck and to the ground. Follow all safety rules while unloading the equipment to prevent damage to the equipment or injury to personnel.

After unloading the equipment, you will unpack it before placing it inside the field kitchen. You will need a hammer and a crowbar for this task. The crates are made of plywood and nailed shut for storage or transport. In some Marine Corps units, hinges, hasps, and locks are used to make the task easier. In such instances, be sure to remember the keys.

Exercise extreme care when opening the crates and removing the equipment to prevent damage to the crates or equipment. The crates will be used again later to repack the equipment when field mess operations are ended.

KITCHEN EQUIPMENT ARRANGEMENT

Before placing equipment inside the field kitchen tent, you should first find out what type and quantity of equipment are needed to accomplish the mission. The following are some of the factors that determine the quantity and type of equipment and its location:

- Number of personnel subsisting
- Number of days of operation
- Weather

The field mess equipment to number of personnel ratio is as follows:

- One M59 field range outlit for each group of 50 persons
- One accessory outfit for every two M59 field ranges
- One insulated food container and one vacuum jug for every 25 persons

When planning the layout of the equipment, you should draw a diagram (fig. 11-11) to show where each piece of equipment will be placed. Drawing a diagram will give you a good look at where to place each piece of equipment in relation to the space available. This also will save you time and prevent having to move the equipment around, once it is placed. Last, the diagram will help in determining the appropriate placement to best support the working conditions.

Each of the nine areas shown in figure 11-11 will be discussed in the following paragraphs.

M59 Field Range

The placement of the field ranges (area 1) will change with the season of the year.

In the summer months, the field ranges should be placed in the center of the tent (as shown in fig. 11-11). This allows the heat from the ranges to rise and filter out the air vents and the ends of the tent. In cold weather, the field ranges should be placed along the side walls of the tent. This allows the heat to reflect from the top of the tent and return to the work area.

Fire Extinguishers

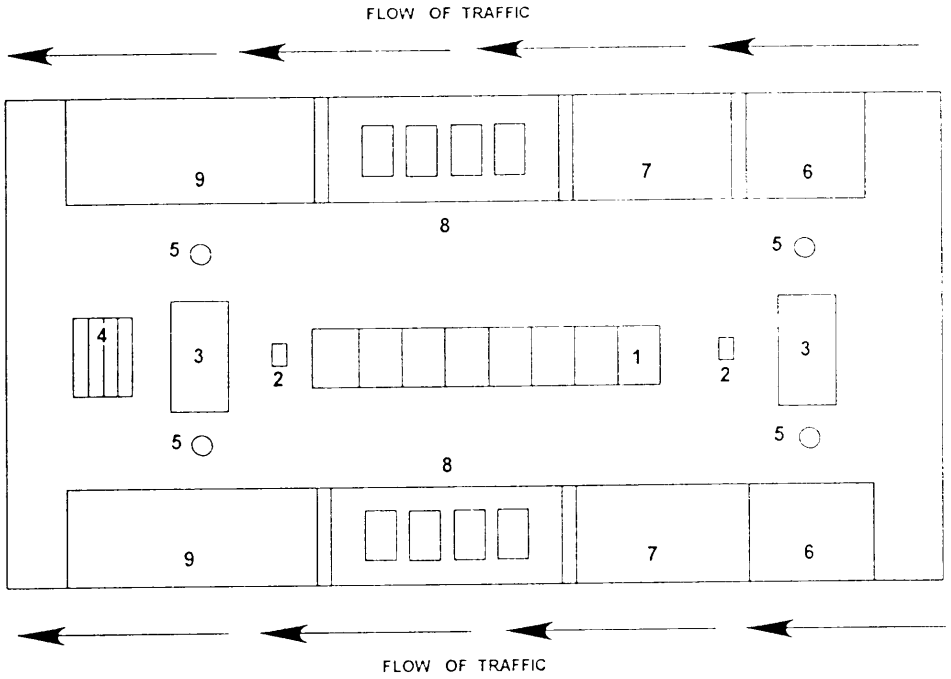
Place the fire extinguishers (area 2) close to the field ranges in case of a fire. One fire extinguisher is required for every two ranges. Instruct all personnel on proper use of the fire extinguishers.

Worktables

Locate the cooks' worktables (area 3) close to the ranges to permit accessibility y to the ranges. Place these tables so they do not interfere with the normal replenishing of the serving line. The cooks' worktables can be the folding type or the packing crates for the field ranges can be used for this purpose.

Ingredients Rack

Place the ingredient rack (area 4) where it will not interfere with the normal flow of traffic during the cooks' meal preparation.



1. M-59 FIELD RANGES - 8
2. FIRE EXTINGUISHERS
3. WORKTABLES
4. INGREDIENTS RACK
5. CANS—32 GAL—TRASH GARBAGE
6. SALAD BAR
7. IMPROVISED GRILL
8. IMPROVISED SERVING LINE
9. CONDIMENT RACK

Figure 11-11.-Diagram showing positioning of equipment used to feed 550 personnel.

Trash Cans

Locate the trash or garbage cans (area 5) where they will be easily accessible for both food preparation and cooking.

Salad Bar

The salad bar (area 6) should be at the head of the serving line. This will allow the troops to make their selection of the cold foods first. This also will prevent a bottleneck in the serving line.

Improvised Grill

The improvised grill would be the next piece of equipment in line (area 7). This will permit all griddle-fried foods to be prepared and served to the troops as they move through the line.

Improvised Serving Line

The serving line should be located next (area 8). All hot foods not served from the improvised grill are served from the serving line.

Condiment Table

The condiment table (area 9) should be the last in line. This permits the troops to select the condiments they wish without interfering with the normal flow of traffic.

Finally, check the placement of the equipment with your diagram. Keep in mind that the diagram should reflect the actual location of the equipment. At this point, each piece of equipment should be placed where it may be used most practically.

FIELD SANITATION

Due to limited facilities in a combat area, the use of proper sanitation measures cannot be overemphasized. Every precaution should be taken to prevent food from becoming infected and utensils from becoming contaminated. Rigorously enforce all personal hygiene measures.

Place a corrugated can of boiling water at the head of the serving line so dinnerware and trays can be predipped. Predipping will partially sterilize utensils and, in cold weather, will give them a desirable warmth.

When using emergency cooking facilities or equipment, do not use galvanized containers for storage of liquids or for cooking any foods and beverages. This is particularly so for acid foods. Pails and garbage cans are examples of galvanized containers. These containers are coated with zinc that dissolves on contact with food acids. Poisoning from this source can result in serious and sometimes fatal illness. Only use these containers to store foods such as flour, sugar, beans, and other bulk dry items.

Field Dishwashing

The field dishwashing unit (fig. 11-12) consists of five corrugated cans placed in line to form a battery. As many such batteries may be used as needed to handle the flow of traffic during the meal period. The recommended battery is made up as follows:

First can:	Garbage waste
Second can:	Contains prewash warm water, detergent, and a long-handled scrub brush attached. Change the prewash water as frequently as necessary to avoid carry-over of grease and food particles into the rest of the system.
Third can:	Contains hot water (120°F to 140°F) with an adequate amount of detergent so washing is accomplished quickly and adequately. This can should have a long-handled scrub brush attached.
Fourth can:	Contains actively boiling water for first rinse.
Fifth can:	Contains actively boiling water for second rinse.

One battery will accommodate 80 people.

After washing the utensils thoroughly in the wash cans, immerse them for a total of 30 seconds in the two rinse cans. When the rinse water is actively boiling, this procedure will achieve sanitation. Hot water is the preferred method of sanitation, but chemicals may be used.

After the battery has been secured, scrub the cans thoroughly, flush them, and invert them to allow complete draining and drying. Mark each can for its designated use. This will aid in restricting use of each can to the purpose that it is intended.

For complete information on field dishwashing and sanitation, refer to the *Manual of Naval Preventive Medicine,* NAVMED P-5010, chapter 9, and the *Standard Organization and Regulations of the U.S. Navy,* OPNAVINST 3120.32. The contents of these publications will aid you in combating health hazards that are ever-present in these areas.

Cleaning Field Kitchen Equipment

Field messes range from primitive cooking accomplished in a tent to semipermanent structures with piped-in water, concrete decks, and portable galley equipment. Some of these field messes may have stainless steel surfaces for food preparation, although only wooden surfaces may be available in others. Regardless of the type of structure, cleanliness will be the key to the prevention of foodborne illness outbreaks. The following information provides general cleaning guidance and should be used together with chapter 1 of the NAVMED P-5010:

- Thoroughly clean and sanitize all preparation and serving equipment after each meal period.
- Make all needed repairs to equipment as soon as practical.
- Clean and sanitize all food contact surfaces as described in chapter 1 of the NAVMED P-5010.
- Install all foodservice equipment off the ground and protected from contamination by dust and vermin.
- Cover wooden surfaces with clean, heavy wrapping paper or waxed paper. Discard the paper after each meal period. If piper is not available, wipe down the surfaces, scrub with an approved sanitizing solution, and air-dy after each meal period.
- Encourage the use of disposable eating utensils. The benefits of reduced disease risk and water and fuel savings outweigh the solid waste disposal disadvantage.
- Pesticides should only be applied by certified personnel.

The job of servicing and cleaning of the field range cabinet is simple but important. Keep the cabinet as mechanically efficient as the burner unit for peak performance. Your first step in servicing the cabinet should always be to inspect for defects. Check the structure of the cabinet to make sure it is free of holes, dents, and broken welds. Check the rails to make sure they are straight, undented, and firmly welded into the cabinet.

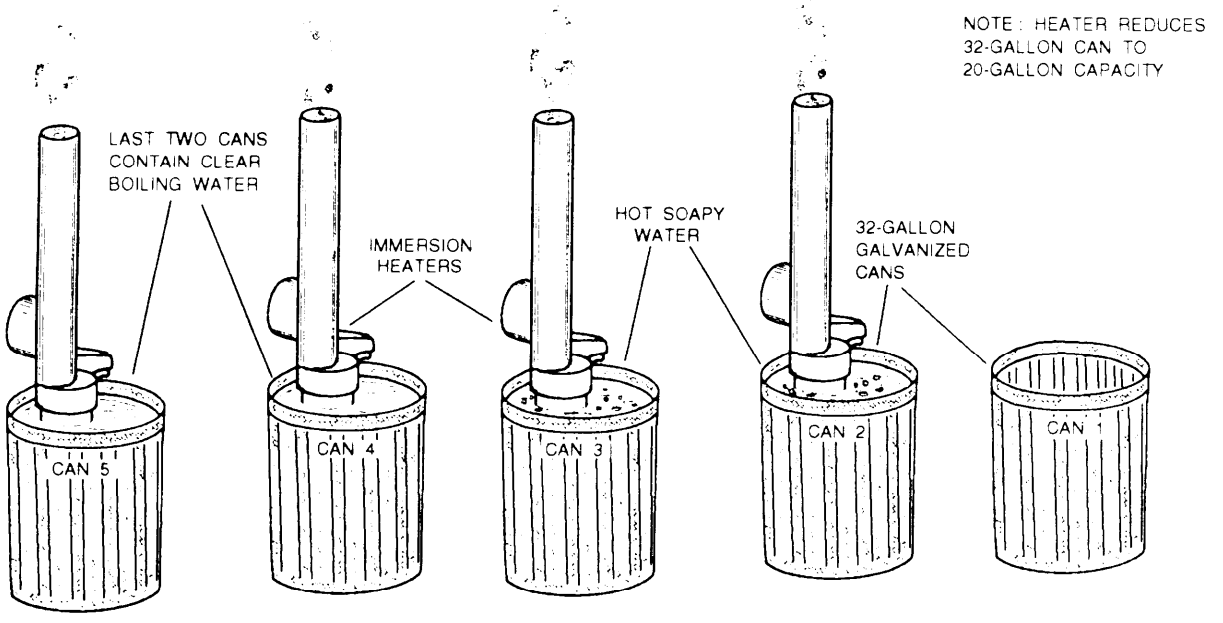


Figure 11-12.-Five-can dishwashing battery.

Lubricate all moving parts with light lubricating oil to ensure proper functioning. Examples of moving parts are hinges, handles, and rollers. You should lubricate the rails within the cabinet (used for positioning the burner unit) with an antiseize compound. This makes it easy to slide the cradle with the cooking pot and the burner unit in and out of the cabinet.

You should clean the field range cabinet after each meal. This is done by scrubbing with hot soapy water and a stiff scrub brush to prevent buildup of drippings and food particles. You also should clean the cabinet as you go. Spilled liquids on the cabinet should be wiped off immediately. Do not allow food particles and liquids to bake onto the cabinet.

Do not use abrasives such as a wire brush, steel wool, or emery cloth on the sheet metal or aluminum alloy. To do this would mar the finish. Rinse the cabinet thoroughly with hot clear water and dry.

Pest Control

Sanitary precautions include measures to eliminate pests and prevent their breeding. The two most important types of pests for you to control are flies and rodents.

FLIES.— In areas where flies are present in large numbers, special care must be taken. The housefly breeds in excrement of human beings and animals as well as decomposing vegetable and animal matter. Disease organisms are carried on the feet of the fly to food and utensils. The fly takes only liquid foods and regurgitates to dissolve solids. This process causes further contamination.

Extreme care should be taken to prevent access of flies to food utensils, kitchens, and feeding areas. In a permanent camp, all areas that attract flies should be well screened. It should be standard operating procedure that the galley be screened before hot food is prepared init. Screens should have a mesh of 18 wires to the inch (18 mesh), which also keeps out mosquitos. In a semipermanent camp, screening may be impractical; so, dependence must be placed upon cleanliness and insectproof containers.

When there is no metal screening available, mosquito netting, target cloth, or similar material may be used to flyproof tents, galleys, and storage areas. Leaking screens (especially cracks around the screen door) frequently convert a building into a flytrap; that is, flies can enter the building but are unable to exit. Screen doors should be made to open outward and should be in direct sunlight, when practical. Fly breeding in human excreta is particularly dangerous; thus, whenever possible, latrines should be carefully flyproofed.

The substances that may be used to kill the adult fly are often extremely poisonous. Thus, the use of these

substances is the responsibility of the medical officer, as is the use of measures to prevent breeding of flies. However, it is up to you to keep flies off the food in the galley and feeding areas. When flies are present, food servers should keep covers on serving containers except when they are actually placing food on trays.

Use traps or flyswatters freely. Sticky flypaper can be made by heating castor oil (five parts by weight) and powdered resin (eight parts) until the resin is dissolved Do not boil this solution. Apply it to glazed paper while it is still hot or paint it on iron hoops or wire strands. Wires so painted should be cleaned and recoated every 2 or 3 days.

RODENTS.— The rodent is an ever-present menace to operations in the field. Rodents such as rats, mice, and ground squirrels are reservoirs for plague, endemic typhus, tularemia, and many other debilitating diseases. When operations become more stable and semipermanent or permanent camps are established, the additional hazard of the destruction of material must be considered. The distribution of rodents may be considered universal. Therefore, the problem of their control is encountered during operation in any geographical location.

Rodent control is the responsibility of the medical officer, but the proper handling of food and the prompt disposal of trash and garbage are essential and lie within your domain. Food supplies should be stored on elevated platforms. If possible, all food stores should be packaged in ratproof containers. When buildings are used, all doors should be self-closing and tight-fitting. All other openings in excess of 1/2 inch should be closed with material resistant to gnawing rodents or screened with 1/2-inch mesh hardware cloth. Chapter 6 of the NAVMED P-5010 has additional information on the destruction of rodents.

LOADING KITCHEN EQUIPMENT

Make sure there is a loading plan for the equipment.

Prepare the equipment for transport by disconnecting it as outlined in the appropriate manuals. Be sure to drain water and fuel from water pumps, water heaters, and fuel tanks.

You should inspect and inventory the equipment before loading it to make sure all parts are present and undamaged You can then pack the equipment into the original crates.

If you are moving to a new site, items that will be needed last should be loaded first. This equipment is heavy. Follow all safety rules while loading the equipment. Improper handling can result in damage or loss of equipment and personnel.

Distribution of the equipment in the truck is important. Improper distribution (underloading and overloading) can cause damage to the equipment and the vehicle. Load all heavy items on the bottom. Load equipment only as high as the truck will allow.

Finally, make one last check to make sure all equipment is properly secured against movement and protected from weather.

Following the correct procedures for closing the field kitchen area of operations is extremely important. You must consider the environmental impacts caused by soakage pits, grease traps, trash pits, and incinerators. Also, you must understand the battlefield signature that a haphazardly closed field kitchen site can leave for enemy forces. FM 5-20, *Camouflage*, and FM 21-10, *Field Sanitation and Hygiene* (Army field manuals), provide information to help you properly close your field kitchen site.